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I.R.I.'S 1990 R&D TRENDS SURVEY

1990 will see top management paying greater attention to R&D while continuing to keep a tight rein on spending.

As the decline in U.S. competitive position and the potential contribution of technology to the reversal of present trends become increasingly familiar corporate concerns, directors of R&D are feeling the heat. For the sixth straight year, almost half of the respondents to the I.R.I. trends survey expect increased top-management attention to R&D during the next twelve months. However, increased interest from top management does not necessarily mean corresponding increases in funding, and survey participants are becoming less optimistic about the prospects for overall funding growth.

Continuing competitive pressure on the business brings with it increasing demands on R&D resources. For example, in 1990, 31 percent of respondents expect to need more resources for new-business projects, and 33 percent expect to spend more on joint-venture activity. More ominously, 38 percent of participants are expecting to see increases in R&D expenditures to meet government legislation and standards.

Faced with more management attention and the prospect of low growth in expenditures for R&D in 1990, as well as the need to provide more funding for business development, joint ventures and government regulation, what are R&D directors going to squeeze? The survey suggests that overall funding of university R&D is unlikely to grow and is under increasing scrutiny. About twice as many companies expect to reduce university support in 1990 as in last year's survey. In addition, there are a few cases where capital spending for R&D may be curtailed in 1990.

The I.R.I.'s sixth annual survey of industrial research trends was sent to 253 member companies. Replies were received from 119, a 47 percent response. Respondents were asked to estimate the relative change in levels between 1989 and 1990 in: Expenditures, Effort Allocation, Personnel Trends, and Other Trends. As in previous years, a scale of 1-5 was used, with 1 representing "significantly less" (-5 percent or less), 2 "slightly less" (0 to -5 percent more), 3 "approximately the same" (1 to 5 percent more), 4 "slightly more" (6 to 15 percent), 5 "significantly more" (>15 percent). Respondents could also check "NA" for "not applicable", and "NR" for "not important to you."

1. Top Management Attention - Over 46 percent of respondents expected to see top management attention to research on longer term strategic issues increase by more than 5 percent in 1990. In the 1989 survey, 49.9 percent made this prediction. Even more participants expect top management's attention to development to increase

The survey on which this article is based was conducted by the I.R.I. Research-on-Research Committee, with the assistance of Lee W. Rivers of the I.R.I. staff. The article was prepared by Graham R. Mitchell of GTE Laboratories and includes major contributions from Edwin R. Carlisle of National Defense University and James Drew of GTE Laboratories.

Table 1. Forecast of 1990 Trends by Industry

	R&D as % of Sales		Operational Costs of R&D Profs. (X \$000)		Capital Expenditures for R&D as % of budget			R&D Profs. as % of total R&D	
	1989	1990	1989	1990	1988	1989	1990	1989	1990
Chemicals & Plastics (14 companies)	3	3	172	179	11	14	13	53	53
Food, Tobacco & Kindred Products (11 companies)	1	1	135	141	12	12	11	65	66
Petroleum & Related Industries (11 companies)	1	1	160	163	11	11	14	55	55
Primary Metal Industries (9 companies)	1	1	170	173	14	14	14	47	47
Pharmaceuticals & Personal Care Products (8 companies)	10	10	149	157	15	20	18	54	55
Electrical Machinery, Equipment & Supplies (7 companies)	4	4	197	198	12	11	11	45	45
Other (31 companies)	5	5	153	157	12	12	14	59	59

by more than 5 percent; 52 percent in 1990, 51 percent in 1989. Data from all previous I.R.I. surveys show that at least 43 percent of respondents have made predictions of increased management attention every year since 1985, suggesting a sustained buildup of top-management interest during this period.

2. Total R&D Expenditures - Although the present estimate for R&D expenditures is mildly optimistic on average in that 33.6 percent of respondents project an increase in 1990 and only 17 percent project a decline, the overall trend is not encouraging. The fraction of respondents projecting total expenditures for R&D to grow by more than 5 percent, has declined steadily from 44 percent in 1985 to 35.5 percent in 1989.

3. Manpower Levels - The related question on manpower levels shows the same trend. For 1990, an increase is projected by 26.1 percent of respondents, compared with a decrease by 20.1 percent. However this represents a deceleration in staffing buildup, as 36.1 percent were expecting increases in 1989.

4. Response to Legislation - The survey shows a discouraging rise in the number of respondents predicting the need for more R&D in response to legislation. In 1989, this was 28.2 percent of respondents, in the 1990 survey it is 38.1 percent.

5. Alliances and Joint Ventures - In the 1988 survey, when the question was first introduced, 52 percent anticipated greater "participation" in joint ventures. By 1989, this had dropped to 40 percent, and in the current survey only 33 percent expect greater participation in 1990. Even though overall funding for joint ventures is expected to grow next year, the decline over the last three years in the number of respondents anticipating growth has been dramatic.

Table 2. Survey Questionnaire Results

Expected Changes in 1990 Compared with 1989 Experience	Relative Change (Number of Responses)						
	NA	1	2	3	4	5	NR
<u>Expenditures</u>							
1. Total R&D expenditures	0	8	11	60	37	3	0
2. Ratio of direct salaries and wages to other direct R&D costs	1	2	13	88	14	1	0
3. Capital spending for R&D operations	0	13	13	66	19	8	0
4. Subcontracting R&D to outside commercial organizations	8	2	13	68	22	2	4
5. Grants, contracts, etc. for university R&D	2	7	17	68	24	1	0
<u>Effort Allocation</u>							
6. Relative distribution of R&D costs:							
a. Support of existing business	0	3	8	86	20	2	0
b. Directed basic research*	7	8	14	70	17	2	1
c. New-business projects	2	5	14	62	33	3	0
7. Ratio of non-centralized (e.g., divisional) to centralized corporate R&D efforts	14	2	15	67	17	4	0
8. Outside-customer technical- service efforts relative to total R&D (in time or dollars)	9	2	10	83	13	1	1
9. R&D efforts in response to existing or proposed legislation, standards, or other governmental rules (in time or dollars)	5	4	7	59	39	4	1
<u>Personnel Trends</u>							
10. R&D professional manpower level	0	6	18	64	29	2	0
11. Hiring new graduates	5	8	13	67	25	0	0
<u>Other Trends</u>							
12. Top management attention to Research on longer term or strategic issues	0	3	10	51	49	6	0
13. Top management attention to Development	0	0	5	52	53	9	0
14. Participation in consortia for precompetitive univer- sity research	16	3	11	66	19	1	3
15. Participation in alliances and joint ventures for R&D	7	3	4	68	32	5	0
16. Licensing technology from others (dollar volume)	5	2	4	88	14	1	5

(continued)

Table 2 (continued)

Expected Changes in 1990 Compared with 1989 Experience	Relative Change (Number of Responses)					
	NA	1	2	3	4	5 NR
17. Licensing technology to others (dollar volume)	9	2	2	82	18	2 4
18. Extent of government financial support of R&D	38	2	8	47	10	3 11
19. Contacts with Federal Laboratories	23	1	3	65	20	1 6
20. Overhead costs	1	3	22	76	15	2 0

Quantitative Data

21. What is your capital expenditure for R&D as a percent of your R&D Budget?
1988 13%; 1989 13%; 1990: 14%
22. R&D expenditures as percent of sales: 1989 3.4%; anticipated for 1990 3.3%
23. R&D professionals as a percent of total R&D personnel: 1989 55%; anticipated for 1990 55%
24. Operational costs per R&D professional**
a. for 1989 \$155,000
b. estimate for 1990 \$160,000

*Research whose outcome may be unknown at the time the work is undertaken but where there's a reasonable expectation that findings will be valuable to the supporting organization.

**Refers to the actual cost of operating the laboratory. Numerator consists of such costs as salaries (professional and non-professional), fringe benefits, travel, training, supplies, secretarial, managerial, analytical and testing services in-house and outside, utilities, taxes, and depreciation. Denominator includes total number of technical professionals at the laboratory, whether in technical or managerial activities.

6. Distribution of R&D Costs - No major changes are predicted for the level of support of basic research or existing business, but an increase in spending for new-business projects is likely as 30.8 percent predict greater spending and only 16.3 percent less. However, this projection is markedly down from last year's survey when 43.2 percent were anticipating growth in funding for new-business projects.

7. Funding University R&D - The survey suggests that some respondents are planning to cut the funding of university R&D. For 1990, 14.5 percent of respondents anticipate spending "slightly less," and 6 percent "significantly less" on university R&D. The situation appears to be changing for the worse as the corresponding numbers from the 1989 survey are 8.9 percent and 1.5 percent.

8. Other Trends - For the total sample, no significant changes are anticipated in capital expenditures as a percent of sales or budget, and the operational costs per R&D professional are expected to increase only modestly from \$155,000 to \$160,000. The industry comparison breaks down into two groups; pharmaceuticals and the rest. Capital expenditures for pharmaceutical companies for 1989 and 1990 are 20 percent and 18 percent of R&D budget, compared with 13 percent and 14 percent for the total sample. For the same years, R&D expenditures for pharmaceuticals are 10 percent of sales compared with 3.4 and 3.3 percent of sales for the total survey.